Amendment to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (currently amended): A method of providing automatic gain and tilt control in a WDM (wavelength division multiplexing) optical communication system, the method comprising:

receiving ~~at least one reference signal~~ over an optical fiber at least one sub-band of WDM signals and first and second reference signals, the first reference signal at a first boundary of the sub-band and the second reference signal at a second boundary of the sub-band;

detecting the first and second reference ~~signal~~ signals;

analyzing the reference ~~signal~~ signals to determine~~, in part,~~ power variation of the reference signals;

outputting a control signal to compensate~~, in part,~~ for losses and gain tilt accumulation in the sub-band associated with the optical fiber based upon the analyzing step ~~and gain tilt accumulation~~; and

controlling an optical gain unit in response to the control signal.

Claim 2 (original): The method according to claim 1, wherein the optical gain unit in the controlling step is a Raman pump unit, the method further comprising:

injecting a counter-propagant pump light by the Raman pump unit into the optical fiber in response to the control signal.

Claim 3 (original): The method according to claim 2, further comprising:

injecting a co-propagant pump light into the optical fiber by another Raman pump unit.

Claim 4 (currently amended): The method according to claim 2, wherein the counter-propagant pump light in the injecting step is produced by the optical gain unit having a

plurality of laser diodes ~~that are controlled to output~~ generating a plurality of output lights of different wavelengths, the output lights being multiplexed.

Claim 5 (cancel)

Claim 6 (cancel)

Claim 7 (cancel)

Claim 8 (currently amended): The method according to claim **[[6]]** 1, wherein the analyzing step comprises:

~~**computing**~~ determining a relative power difference between the reference signals.

Claim 9 (currently amended): The method according to claim **[[6]]** 1, wherein the analyzing step comprises:

~~**computing**~~ determining an average ~~**voltage**~~ power of the reference signals~~; **and**~~ ~~**comparing the computed average voltage to a reference voltage**~~.

Claim 10 (currently amended): The method according to claim **[[6]]** 1, wherein the analyzing step comprises:

~~**computing**~~ generating voltages corresponding to ~~**of**~~ the reference signals;

comparing the ~~**computed**~~ generated voltages to a reference voltage; and

determining whether the reference signals are degraded based upon the comparing step.

Claim 11 (original): The method according to claim 10, further comprising:

outputting an alarm signal based upon determining that one of the reference signals is degraded.

Claim 12 (currently amended): The method according to claim 1, further comprising:

extracting and regenerating the reference ~~**signal**~~ signals.

Claim 13 (cancel)

Claim 14 (currently amended): The method according to claim **[[13]]** 1, wherein the ~~**sub-band includes at least one of a C-band and a L-band**~~ receiving step comprises receiving over the optical fiber first and second sub-bands of WDM signals, and first and second reference signals for each sub-band, the first reference signal at a first boundary of its sub-band and the second reference signal at a second boundary of its sub-band.

Claim 15 (currently amended): A WDM (wavelength division multiplexing) optical communication system for providing automatic gain and tilt control, comprising:

an optical fiber that carries ~~**a plurality**~~ at least one sub-band of WDM optical signals, ~~**at least one of the optical signals being**~~ a first reference signal at a first boundary of the sub-band, and a second reference signal at a second boundary of the sub-band;

an optical gain unit coupled to the optical fiber and configured to output lights to compensate~~**, in part**~~ for losses and gain tilt accumulation in the sub-band ~~**associated with the optical fiber and gain tilt accumulation**~~; and

a controller configured to control the optical gain unit, the controller detecting and analyzing the reference ~~**signal**~~ signals to determine~~**, in part,**~~ power variation of the reference ~~**signal**~~ signals, wherein the controller outputs a control signal to the optical gain unit based upon the analyzed reference ~~**signal**~~ signals~~**; and**~~

~~**an optical amplifier coupled to the optical fiber and configured to amplify the optical signals, the optical gain unit providing a constant power per channel at an input of the optical amplifier**~~.

Claim 16 (currently amended): The system according to claim 15, wherein the optical gain unit ~~is~~ comprises a Raman pump unit that is configured to inject a counter-propagant pump light into the optical fiber.

Claim 17 (currently amended): The system according to claim [[15]] 16, further comprising:

another Raman pump unit coupled to the optical fiber and configured to inject a co-propagant pump light into the optical fiber.

Claim 18 (original): The system according to claim 16, wherein the Raman pump unit is located remotely from the controller.

Claim 19 (original): The system according to claim 16, wherein the controller is collocated with the Raman pump unit.

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Claim 20 (currently amended): The system according to claim 16, wherein the Raman pump unit comprises:

a plurality of laser diodes that are individually controlled to output a plurality of output signals of different wavelengths, the output signals being multiplexed.

Claim 21 (currently amended): The system according to claim 15, wherein the ~~optical gain unit is a variable optical attenuator that is configured to adjust gain response based upon the reference signal~~ reference signals are part of the sub-band.

Claim 22 (cancel)

Claim 23 (cancel)

Claim 24 (currently amended): The system according to claim ~~22~~ 15, wherein the controller is configured to compute a relative power difference between the reference signals.

Claim 25 (currently amended): The system according to claim ~~22~~ 15, wherein the controller is configured to ~~compute~~ determine an average ~~voltage~~ power of the reference signals ~~and to compare the computed average voltage to a reference voltage~~.

Claim 26 (currently amended): The system according to claim ~~22~~ 15, wherein the controller is configured to ~~compute~~ generate voltages corresponding to ~~of~~ the reference signals and to compare the ~~computed~~ generated voltages to a reference voltage to determine whether the reference signals are degraded.

Claim 27 (currently amended): The system according to claim ~~22~~ 15, wherein the controller is configured to output an alarm signal based upon determining that one of the reference signals is degraded.

Claim 28 (currently amended): The system according to claim ~~16~~ 15, further comprising:

an optical service channel (OSC) unit configured to extract and regenerate the reference ~~signal~~ signals, wherein the controller resides within the OSC unit.

Claim 29 (currently amended): The system according to claim ~~22~~ 15, ~~wherein another one of the optical signals is another reference signal, the system~~ further comprising:

an extraction and regeneration circuit configured to extract and regenerate the reference signals, wherein the controller computes relative power difference and average power of the reference signals.

Claim 30 (currently amended): The system according to claim ~~16~~ 63, wherein the optical amplifier is an Erbium Doped Fiber Amplifier (EDFA).

Claim 31 (cancel)

Claim 32 (currently amended): The system according to claim [[31]] 15, wherein the ~~sub-band includes at least one of a C-band and a L-band~~ optical fiber carries first and second sub-bands of WDM optical signals, a first reference signal at a first boundary of each sub-band and a second reference signal at a second boundary of each sub-band.

Claim 33 (currently amended): An optical device for providing automatic gain and tilt control in a WDM (wavelength division multiplexing) optical communication system, comprising:

an input coupled to an optical fiber carrying at least one sub-band of WDM optical signals and reference signals at the boundaries of the sub-band, the input receiving ~~a plurality of~~ the reference signals;

a plurality of photodiodes configured to convert the reference signals to corresponding electrical signals; and

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a controller coupled to the photodiodes and configured to output a control signal to at least one ~~of a~~ Raman pump unit and a variable optical attenuator to compensate~~, in part,~~ for gain tilt and gain variation based upon the reference signals.

Claim 34 (original): The device according to claim 33, wherein the Raman pump unit is configured to inject a counter-propagant pump light into the optical fiber.

Claim 35 (currently amended): The device according to claim 33, wherein ~~one of~~ the reference signals ~~occupies a first boundary of a sub-band, and another of the reference signals occupies a second boundary~~ are part of the sub-band.

Claim 36 (currently amended): The device according to claim 33, wherein the controller is configured to ~~compute~~ determine a relative power difference between the reference signals.

Claim 37 (currently amended): The device according to claim 33, wherein the controller is configured to ~~compute~~ determine an average voltage of the reference signals and to compare the ~~computed~~ determined average voltage to a reference voltage.

Claim 38 (currently amended): The device according to claim 33, wherein the controller is configured to ~~compute~~ generate voltages of the electrical signals corresponding to the reference signals and to compare the ~~computed~~ generated voltages to a reference voltage to determine whether the reference signals are degraded.

Claim 39 (original): The device according to claim 38, wherein the controller is configured to output an alarm signal based upon determining that one of the reference signals is degraded.

Claim 40 (original): The device according to claim 33, further comprising:

an extraction and regeneration circuit configured to extract and regenerate the reference signals.

Claim 41 (cancel)

Claim 42 (currently amended): The device according to claim ~~41~~ 33, wherein the ~~sub-band includes at least one of a C-band and a L-band~~ optical fiber carries first and second sub-bands of WDM optical signals, and reference signals at the boundaries of each sub-band.

Claim 43 (currently amended): A WDM (wavelength division multiplexing) optical communication system for providing automatic gain and tilt control, comprising:

an optical fiber that carries ~~a plurality of~~ at least one sub-band of WDM optical signals~~, at least one of the optical signals being a reference signal~~ and reference signals at the boundaries of the sub-band;

a light emitting means coupled to the optical fiber for outputting lights to compensate~~, in part,~~ for losses ~~associated with the optical fiber~~ and gain tilt accumulation;

a controlling means for controlling the light emitting means, the controlling means detecting and analyzing the reference ~~signal~~ signals to determine~~, in part,~~ power variation of the reference ~~signal~~ signals, the controlling means outputting a control signal to the optical gain unit based upon the analyzed reference ~~signal~~ signals~~; and~~

~~an amplifying means coupled to the optical fiber for amplifying the optical signals,~~

~~wherein the light emitting means provides a constant power per channel at an input of the amplifying means~~.

Claim 44 (original): The system according to claim 43, wherein the light emitting means includes a Raman pump unit that injects a counter-propagant pump light into the optical fiber.

Claim 45 (original): The system according to claim 43, further comprising:

another light emitting means that includes a Raman pump unit that injects a co-propagant pump light into the optical fiber.

Claim 46 (original): The system according to claim 44, wherein the Raman pump unit is located remotely from the controlling means.

Claim 47 (original): The system according to claim 44, wherein the controlling means is collocated with the Raman pump unit.

Claim 48 (currently amended): The system according to claim 44, wherein the Raman pump unit comprises:

a plurality of laser diodes that are individually controlled to output a plurality of output signals at different wavelengths, the output signals being multiplexed.

Claim 49 (currently amended): The system according to claim 43, wherein the ~~light emitting means is a variable optical attenuator that adjusts gain response based upon the reference signal~~ reference signals are part of the sub-band.

Claim 50 (cancel)

Claim 51 (cancel)

Claim 52 (currently amended): The system according to claim ~~50~~ 43, wherein the controlling means ~~computes~~ determines a relative power difference between the reference signals.

Claim 53 (currently amended): The system according to claim ~~50~~ 43, wherein the controlling means ~~computes~~ determines an average voltage of the reference signals and compares the computed average voltage to a reference voltage.

Claim 54 (currently amended): The system according to claim ~~50~~ 43, wherein the controlling means ~~computes~~ generates voltages corresponding to ~~of~~ the reference signals and compares the ~~computed~~ generated voltages to a reference voltage to determine whether the reference signals are degraded.

Claim 55 (currently amended): The system according to claim ~~50~~ 43, wherein the controlling means outputs an alarm signal based upon determining that one of the reference signals is degraded.

Claim 56 (currently amended): The system according to claim ~~44~~ 43, further comprising:

an optical service channel (OSC) unit configured to extract and regenerate the reference ~~signal~~ signals, wherein the controlling means resides within the OSC unit.

Claim 57 (currently amended): The system according to claim 43, ~~**wherein another one of the optical signals is another reference signal,**~~ the system further comprising:

extraction and regeneration means for extracting and regenerating the reference signals, wherein the controlling means computes relative power difference and average power of the reference signals.

Claim 58 (currently amended): The system according to claim ~~**43**~~ 67, wherein the amplifying means is an Erbium Doped Fiber Amplifier (EDFA).

Claim 59 (cancel)

Claim 60 (currently amended): The system according to claim ~~**59**~~ 43, wherein the ~~**sub-band includes at least one of a C-band and a L-band**~~ optical fiber carries first and second sub-bands of WDM optical signals, and reference signals at the boundaries of each sub-band.

Claim 61 (new): The method of claim 1, wherein the reference signals are part of the sub-band.

Claim 62 (new): The method of claim 14, wherein the first sub-band is part of C-band, and the second sub-band is part of L-band.

Claim 63 (new): The system of claim 15 further comprising

an optical amplifier coupled to the optical fiber and configured to amplify the WDM optical signals, the optical gain unit providing a constant power per channel at an input of the optical amplifier.

Claim 64 (new): The system of claim 32, wherein the first sub-band is part of C-band, and the second sub-band is part of L-band.

Claim 65 (new): The device of claim 34, further comprising a variable optical attenuator configured to control power from the optical fiber injected by the counter-propagant pump light from the Raman pump unit into an Erbium doped fiber amplifier.

Claim 66 (new): The device of claim 42, wherein a first sub-band is part of C-band, and a second sub-band is part of L-band.

Claim 67 (new): The system of claim 43, further comprising

an amplifying means coupled to the optical fiber for amplifying the optical signals,

wherein the light emitting means provides a constant power per channel at an input of the amplifying means

Claim 68 (new): The system of claim 60, wherein a first sub-band is part of C-band, and a second sub-band is part of L-band.